



SEQUENCE LISTING

<110> Fike, John D.  
Ishioaka, Glenn  
Sette, Alessandro  
Chestnut, Robert W.

<120> HLA-A2 Tumor Associated Antigen Peptides and Compositions

<130> 2060.0150007

<140> 10/553,703

<141> 2005-10-18

<150> PCT/US2004/011895

<151> 2004-04-16

<150> US 60/463,724

<151> 2003-04-18

<160> 43

<170> PatentIn version 3.3

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<213> Mus sp.

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<222> (1)..(1)

<223> Ala is D-alanine.

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<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<220>

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<222> (13)..(13)

<223> Ala is D-alanine.

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Ala Lys Xaa Val Ala Ala Trp Thr Leu Lys Ala Ala Ala  
1 5 10

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Arg Leu Leu Gln Glu Thr Glu Leu Val  
1 5

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Tyr Leu Gln Leu Val Phe Gly Ile Glu Val  
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Leu Leu Thr Phe Trp Asn Pro Pro Val  
 1 5

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Ser Met Pro Pro Pro Gly Thr Arg Val  
 1 5

<210> 6  
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 <222> (3)..(3)  
 <223> Xaa is alpha-aminoisobutyric acid.

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Lys Leu Xaa Pro Val Gln Leu Trp Val  
 1 5

<210> 7  
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 <213> Mus sp.

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Lys Val Phe Gly Ser Leu Ala Phe Val  
 1 5

<210> 8  
 <211> 9  
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Tyr Leu Ser Gly Ala Asp Leu Asn Leu  
 1 5

<210> 9  
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 <213> Mus sp.

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Ile Met Ile Gly His Leu Val Gly Val  
 1 5

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Lys Val Ala Glu Ile Val His Phe Leu  
 1 5

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 <211> 702  
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Met Glu Ser Pro Ser Ala Pro Pro His Arg Trp Cys Ile Pro Trp Gln  
 1 5 10 15

Arg Leu Leu Leu Thr Ala Ser Leu Leu Thr Phe Trp Asn Pro Pro Thr  
 20 25 30

Thr Ala Lys Leu Thr Ile Glu Ser Thr Pro Phe Asn Val Ala Glu Gly  
 35 40 45

Lys Glu Val Leu Leu Leu Val His Asn Leu Pro Gln His Leu Phe Gly  
 50 55 60

Tyr Ser Trp Tyr Lys Gly Glu Arg Val Asp Gly Asn Arg Gln Ile Ile  
 65 70 75 80

Gly Tyr Val Ile Gly Thr Gln Gln Ala Thr Pro Gly Pro Ala Tyr Ser  
85 90 95

Gly Arg Glu Ile Ile Tyr Pro Asn Ala Ser Leu Leu Ile Gln Asn Ile  
100 105 110

Ile Gln Asn Asp Thr Gly Phe Tyr Thr Leu His Val Ile Lys Ser Asp  
115 120 125

Leu Val Asn Glu Glu Ala Thr Gly Gln Phe Arg Val Tyr Pro Glu Leu  
130 135 140

Pro Lys Pro Ser Ile Ser Ser Asn Asn Ser Lys Pro Val Glu Asp Lys  
145 150 155 160

Asp Ala Val Ala Phe Thr Cys Glu Pro Glu Thr Gln Asp Ala Thr Tyr  
165 170 175

Leu Trp Trp Val Asn Asn Gln Ser Leu Pro Val Ser Pro Arg Leu Gln  
180 185 190

Leu Ser Asn Gly Asn Arg Thr Leu Thr Leu Phe Asn Val Thr Arg Asn  
195 200 205

Asp Thr Ala Ser Tyr Lys Cys Glu Thr Gln Asn Pro Val Ser Ala Arg  
210 215 220

Arg Ser Asp Ser Val Ile Leu Asn Val Leu Tyr Gly Pro Asp Ala Pro  
225 230 235 240

Thr Ile Ser Pro Leu Asn Thr Ser Tyr Arg Ser Gly Glu Asn Leu Asn  
245 250 255

Leu Ser Cys His Ala Ala Ser Asn Pro Pro Ala Gln Tyr Ser Trp Phe  
260 265 270

Val Asn Gly Thr Phe Gln Gln Ser Thr Gln Glu Leu Phe Ile Pro Asn  
275 280 285

Ile Thr Val Asn Asn Ser Gly Ser Tyr Thr Cys Gln Ala His Asn Ser  
290 295 300

Asp Thr Gly Leu Asn Arg Thr Thr Val Thr Thr Ile Thr Val Tyr Ala  
305 310 315 320

Glu Pro Pro Lys Pro Phe Ile Thr Ser Asn Asn Ser Asn Pro Val Glu

Val Thr Arg Asn Asp Ala Arg Ala Tyr Val Cys Gly Ile Gln Asn Ser  
565 570 575

Val Ser Ala Asn Arg Ser Asp Pro Val Thr Leu Asp Val Leu Tyr Gly  
 580 585 590

Pro Asp Thr Pro Ile Ile Ser Pro Pro Asp Ser Ser Tyr Leu Ser Gly  
 595 600 605

Ala Asn Leu Asn Leu Ser Cys His Ser Ala Ser Asn Pro Ser Pro Gln  
 610 615 620

Tyr Ser Trp Arg Ile Asn Gly Ile Pro Gln Gln His Thr Gln Val Leu  
 625 630 635 640

Phe Ile Ala Lys Ile Thr Pro Asn Asn Asn Gly Thr Tyr Ala Cys Phe  
 645 650 655

Val Ser Asn Leu Ala Thr Gly Arg Asn Asn Ser Ile Val Lys Ser Ile  
 660 665 670

Thr Val Ser Ala Ser Gly Thr Ser Pro Gly Leu Ser Ala Gly Ala Thr  
 675 680 685

Val Gly Ile Met Ile Gly Val Leu Val Gly Val Ala Leu Ile  
 690 695 700

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 <213> Mus sp.

<400> 12

Met Glu Leu Ala Ala Leu Cys Arg Trp Gly Leu Leu Leu Ala Leu Leu  
 1 5 10 15

Pro Pro Gly Ala Ala Ser Thr Gln Val Cys Thr Gly Thr Asp Met Lys  
 20 25 30

Leu Arg Leu Pro Ala Ser Pro Glu Thr His Leu Asp Met Leu Arg His  
 35 40 45

Leu Tyr Gln Gly Cys Gln Val Val Gln Gly Asn Leu Glu Leu Thr Tyr  
 50 55 60

Leu Pro Thr Asn Ala Ser Leu Ser Phe Leu Gln Asp Ile Gln Glu Val  
 65 70 75 80

Gln Gly Tyr Val Leu Ile Ala His Asn Gln Val Arg Gln Val Pro Leu  
85 90 95

Gln Arg Leu Arg Ile Val Arg Gly Thr Gln Leu Phe Glu Asp Asn Tyr  
100 105 110

Ala Leu Ala Val Leu Asp Asn Gly Asp Pro Leu Asn Asn Thr Thr Pro  
115 120 125

Val Thr Gly Ala Ser Pro Gly Gly Leu Arg Glu Leu Gln Leu Arg Ser  
130 135 140

Leu Thr Glu Ile Leu Lys Gly Gly Val Leu Ile Gln Arg Asn Pro Gln  
145 150 155 160

Leu Cys Tyr Gln Asp Thr Ile Leu Trp Lys Asp Ile Phe His Lys Asn  
165 170 175

Asn Gln Leu Ala Leu Thr Leu Ile Asp Thr Asn Arg Ser Arg Ala Cys  
180 185 190

His Pro Cys Ser Pro Met Cys Lys Gly Ser Arg Cys Trp Gly Glu Ser  
195 200 205

Ser Glu Asp Cys Gln Ser Leu Thr Arg Thr Val Cys Ala Gly Gly Cys  
210 215 220

Ala Arg Cys Lys Gly Pro Leu Pro Thr Asp Cys Cys His Glu Gln Cys  
225 230 235 240

Ala Ala Gly Cys Thr Gly Pro Lys His Ser Asp Cys Leu Ala Cys Leu  
245 250 255

His Phe Asn His Ser Gly Ile Cys Glu Leu His Cys Pro Ala Leu Val  
260 265 270

Thr Tyr Asn Thr Asp Thr Phe Glu Ser Met Pro Asn Pro Glu Gly Arg  
275 280 285

Tyr Thr Phe Gly Ala Ser Cys Val Thr Ala Cys Pro Tyr Asn Tyr Leu  
290 295 300

Ser Thr Asp Val Gly Ser Cys Thr Leu Val Cys Pro Leu His Asn Gln  
305 310 315 320

Glu Val Thr Ala Glu Asp Gly Thr Gln Arg Cys Glu Lys Cys Ser Lys

				325						330						335
Pro	Cys	Ala	Arg	Val	Cys	Tyr	Gly	Leu	Gly	Met	Glu	His	Leu	Arg	Glu	
			340					345					350			
Val	Arg	Ala	Val	Thr	Ser	Ala	Asn	Ile	Gln	Glu	Phe	Ala	Gly	Cys	Lys	
		355					360					365				
Lys	Ile	Phe	Gly	Ser	Leu	Ala	Phe	Leu	Pro	Glu	Ser	Phe	Asp	Gly	Asp	
	370					375					380					
Pro	Ala	Ser	Asn	Thr	Ala	Pro	Leu	Gln	Pro	Glu	Gln	Leu	Gln	Val	Phe	
385					390					395					400	
Glu	Thr	Leu	Glu	Glu	Ile	Thr	Gly	Tyr	Leu	Tyr	Ile	Ser	Ala	Trp	Pro	
				405					410					415		
Asp	Ser	Leu	Pro	Asp	Leu	Ser	Val	Phe	Gln	Asn	Leu	Gln	Val	Ile	Arg	
			420					425					430			
Gly	Arg	Ile	Leu	His	Asn	Gly	Ala	Tyr	Ser	Leu	Thr	Leu	Gln	Gly	Leu	
		435					440						445			
Gly	Ile	Ser	Trp	Leu	Gly	Leu	Arg	Ser	Leu	Arg	Glu	Leu	Gly	Ser	Gly	
	450					455					460					
Leu	Ala	Leu	Ile	His	His	Asn	Thr	His	Leu	Cys	Phe	Val	His	Thr	Val	
465					470					475					480	
Pro	Trp	Asp	Gln	Leu	Phe	Arg	Asn	Pro	His	Gln	Ala	Leu	Leu	His	Thr	
				485					490					495		
Ala	Asn	Arg	Pro	Glu	Asp	Glu	Cys	Val	Gly	Glu	Gly	Leu	Ala	Cys	His	
			500					505					510			
Gln	Leu	Cys	Ala	Arg	Gly	His	Cys	Trp	Gly	Pro	Gly	Pro	Thr	Gln	Cys	
		515					520					525				
Val	Asn	Cys	Ser	Gln	Phe	Leu	Arg	Gly	Gln	Glu	Cys	Val	Glu	Glu	Cys	
	530					535					540					
Arg	Val	Leu	Gln	Gly	Leu	Pro	Arg	Glu	Tyr	Val	Asn	Ala	Arg	His	Cys	
545					550					555					560	
Leu	Pro	Cys	His	Pro	Glu	Cys	Gln	Pro	Gln	Asn	Gly	Ser	Val	Thr	Cys	
				565					570					575		

Phe Gly Pro Glu Ala Asp Gln Cys Val Ala Cys Ala His Tyr Lys Asp  
 580 585 590

Pro Pro Phe Cys Val Ala Arg Cys Pro Ser Gly Val Lys Pro Asp Leu  
 595 600 605

Ser Tyr Met Pro Ile Trp Lys Phe Pro Asp Glu Glu Gly Ala Cys Gln  
 610 615 620

Pro Cys Pro Ile Asn Cys Thr His Ser Cys Val Asp Leu Asp Asp Lys  
 625 630 635 640

Gly Cys Pro Ala Glu Gln Arg Ala Ser Pro Leu Thr Ser Ile Ile Ser  
 645 650 655

Ala Val Val Gly Ile Leu Leu Val Val Val Leu Gly Val Val Phe Gly  
 660 665 670

Ile Leu Ile Lys Arg Arg Gln Gln Lys Ile Arg Lys Tyr Thr Met Arg  
 675 680 685

Arg Leu Leu Gln Glu Thr Glu Leu Val Glu Pro Leu Thr Pro Ser Gly  
 690 695 700

Ala Met Pro Asn Gln Ala Gln Met Arg Ile Leu Lys Glu Thr Glu Leu  
 705 710 715 720

Arg Lys Val Lys Val Leu Gly Ser Gly Ala Phe Gly Thr Val Tyr Lys  
 725 730 735

Gly Ile Trp Ile Pro Asp Gly Glu Asn Val Lys Ile Pro Val Ala Ile  
 740 745 750

Lys Val Leu Arg Glu Asn Thr Ser Pro Lys Ala Asn Lys Glu Ile Leu  
 755 760 765

Asp Glu Ala Tyr Val Met Ala Gly Val Gly Ser Pro Tyr Val Ser Arg  
 770 775 780

Leu Leu Gly Ile Cys Leu Thr Ser Thr Val Gln Leu Val Thr Gln Leu  
 785 790 795 800

Met Pro Tyr Gly Cys Leu Leu Asp His Val Arg Glu Asn Arg Gly Arg  
 805 810 815

Leu Gly Ser Gln Asp Leu Leu Asn Trp Cys Met Gln Ile Ala Lys Gly  
 820 825 830

Met Ser Tyr Leu Glu Asp Val Arg Leu Val His Arg Asp Leu Ala Ala  
 835 840 845

Arg Asn Val Leu Val Lys Ser Pro Asn His Val Lys Ile Thr Asp Phe  
 850 855 860

Gly Leu Ala Arg Leu Leu Asp Ile Asp Glu Thr Glu Tyr His Ala Asp  
 865 870 875 880

Gly Gly Lys Val Pro Ile Lys Trp Met Ala Leu Glu Ser Ile Leu Arg  
 885 890 895

Arg Arg Phe Thr His Gln Ser Asp Val Trp Ser Tyr Gly Val Thr Val  
 900 905 910

Trp Glu Leu Met Thr Phe Gly Ala Lys Pro Tyr Asp Gly Ile Pro Ala  
 915 920 925

Arg Glu Ile Pro Asp Leu Leu Glu Lys Gly Glu Arg Leu Pro Gln Pro  
 930 935 940

Pro Ile Cys Thr Ile Asp Val Tyr Met Ile Met Val Lys Cys Trp Met  
 945 950 955 960

Ile Asp Ser Glu Cys Arg Pro Arg Phe Arg Glu Leu Val Ser Glu Phe  
 965 970 975

Ser Arg Met Ala Arg Asp Pro Gln Arg Phe Val Val Ile Gln Asn Glu  
 980 985 990

Asp Leu Gly Pro Ala Ser Pro Leu Asp Ser Thr Phe Tyr Arg Ser Leu  
 995 1000 1005

Leu Glu Asp Asp Asp Met Gly Asp Leu Val Asp Ala Glu Glu Tyr  
 1010 1015 1020

Leu Val Pro Gln Gln Gly Phe Phe Cys Pro Asp Pro Ala Pro Gly  
 1025 1030 1035

Ala Gly Gly Met Val His His Arg His Arg Ser Ser Ser Thr Arg  
 1040 1045 1050

Ser Gly Gly Gly Asp Leu Thr Leu Gly Leu Glu Pro Ser Glu Glu  
1055 1060 1065

Glu Ala Pro Arg Ser Pro Leu Ala Pro Ser Glu Gly Ala Gly Ser  
1070 1075 1080

Asp Val Phe Asp Gly Asp Leu Gly Met Gly Ala Ala Lys Gly Leu  
1085 1090 1095

Gln Ser Leu Pro Thr His Asp Pro Ser Pro Leu Gln Arg Tyr Ser  
1100 1105 1110

Glu Asp Pro Thr Val Pro Leu Pro Ser Glu Thr Asp Gly Tyr Val  
1115 1120 1125

Ala Pro Leu Thr Cys Ser Pro Gln Pro Glu Tyr Val Asn Gln Pro  
1130 1135 1140

Asp Val Arg Pro Gln Pro Pro Ser Pro Arg Glu Gly Pro Leu Pro  
1145 1150 1155

Ala Ala Arg Pro Ala Gly Ala Thr Leu Glu Arg Pro Lys Thr Leu  
1160 1165 1170

Ser Pro Gly Lys Asn Gly Val Val Lys Asp Val Phe Ala Phe Gly  
1175 1180 1185

Gly Ala Val Glu Asn Pro Glu Tyr Leu Thr Pro Gln Gly Gly Ala  
1190 1195 1200

Ala Pro Gln Pro His Pro Pro Pro Ala Phe Ser Pro Ala Phe Asp  
1205 1210 1215

Asn Leu Tyr Tyr Trp Asp Gln Asp Pro Pro Glu Arg Gly Ala Pro  
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Pro Ser Thr Phe Lys Gly Thr Pro Thr Ala Glu Asn Pro Glu Tyr  
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Leu Gly Leu Asp Val Pro Val  
1250 1255

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Met Pro Leu Glu Gln Arg Ser Gln His Cys Lys Pro Glu Glu Gly Leu  
 1 5 10 15

Glu Ala Arg Gly Glu Ala Leu Gly Leu Val Gly Ala Gln Ala Pro Ala  
 20 25 30

Thr Glu Glu Gln Gln Thr Ala Ser Ser Ser Ser Thr Leu Val Glu Val  
 35 40 45

Thr Leu Gly Glu Val Pro Ala Ala Asp Ser Pro Ser Pro Pro His Ser  
 50 55 60

Pro Gln Gly Ala Ser Ser Phe Ser Thr Thr Ile Asn Tyr Thr Leu Trp  
 65 70 75 80

Arg Gln Ser Asp Glu Gly Ser Ser Asn Gln Glu Glu Glu Gly Pro Arg  
 85 90 95

Met Phe Pro Asp Leu Glu Ser Glu Phe Gln Ala Ala Ile Ser Arg Lys  
 100 105 110

Met Val Glu Leu Val His Phe Leu Leu Leu Lys Tyr Arg Ala Arg Glu  
 115 120 125

Pro Val Thr Lys Ala Glu Met Leu Glu Ser Val Leu Arg Asn Cys Gln  
 130 135 140

Asp Phe Phe Pro Val Ile Phe Ser Lys Ala Ser Glu Tyr Leu Gln Leu  
 145 150 155 160

Val Phe Gly Ile Glu Val Val Glu Val Val Pro Ile Ser His Leu Tyr  
 165 170 175

Ile Leu Val Thr Cys Leu Gly Leu Ser Tyr Asp Gly Leu Leu Gly Asp  
 180 185 190

Asn Gln Val Met Pro Lys Thr Gly Leu Leu Ile Ile Val Leu Ala Ile  
 195 200 205

Ile Ala Ile Glu Gly Asp Cys Ala Pro Glu Glu Lys Ile Trp Glu Glu  
 210 215 220

Leu Ser Met Leu Glu Val Phe Glu Gly Arg Glu Asp Ser Val Phe Ala  
 225 230 235 240

His Pro Arg Lys Leu Leu Met Gln Asp Leu Val Gln Glu Asn Tyr Leu  
                           245                          250                          255

Glu Tyr Arg Gln Val Pro Gly Ser Asp Pro Ala Cys Tyr Glu Phe Leu  
                           260                          265                          270

Trp Gly Pro Arg Ala Leu Ile Glu Thr Ser Tyr Val Lys Val Leu His  
                           275                          280                          285

His Thr Leu Lys Ile Gly Gly Glu Pro His Ile Ser Tyr Pro Pro Leu  
                           290                          295                          300

His Glu Arg Ala Leu Arg Glu Gly Glu Glu  
                           305                          310

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Met Pro Leu Glu Gln Arg Ser Gln His Cys Lys Pro Glu Glu Gly Leu  
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Glu Ala Arg Gly Glu Ala Leu Gly Leu Val Gly Ala Gln Ala Pro Ala  
                           20                          25                          30

Thr Glu Glu Gln Glu Ala Ala Ser Ser Ser Ser Thr Leu Val Glu Val  
                           35                          40                          45

Thr Leu Gly Glu Val Pro Ala Ala Glu Ser Pro Asp Pro Pro Gln Ser  
                           50                          55                          60

Pro Gln Gly Ala Ser Ser Leu Pro Thr Thr Met Asn Tyr Pro Leu Trp  
                           65                          70                          75                          80

Ser Gln Ser Tyr Glu Asp Ser Ser Asn Gln Glu Glu Glu Gly Pro Ser  
                           85                          90                          95

Thr Phe Pro Asp Leu Glu Ser Glu Phe Gln Ala Ala Leu Ser Arg Lys  
                           100                          105                          110

Val Ala Glu Leu Val His Phe Leu Leu Leu Lys Tyr Arg Ala Arg Glu  
                           115                          120                          125

Pro Val Thr Lys Ala Glu Met Leu Gly Ser Val Val Gly Asn Trp Gln

130                      135                      140  
 Tyr Phe Phe Pro Val Ile Phe Ser Lys Ala Ser Ser Ser Leu Gln Leu  
 145                      150                      155                      160  
 Val Phe Gly Ile Glu Leu Met Glu Val Asp Pro Ile Gly His Leu Tyr  
                     165                      170                      175  
 Ile Phe Ala Thr Cys Leu Gly Leu Ser Tyr Asp Gly Leu Leu Gly Asp  
                     180                      185                      190  
 Asn Gln Ile Met Pro Lys Ala Gly Leu Leu Ile Ile Val Leu Ala Ile  
                     195                      200                      205  
 Ile Ala Arg Glu Gly Asp Cys Ala Pro Glu Glu Lys Ile Trp Glu Glu  
                     210                      215                      220  
 Leu Ser Val Leu Glu Val Phe Glu Gly Arg Glu Asp Ser Ile Leu Gly  
 225                      230                      235                      240  
 Asp Pro Lys Lys Leu Leu Thr Gln His Phe Val Gln Glu Asn Tyr Leu  
                     245                      250                      255  
 Glu Tyr Arg Gln Val Pro Gly Ser Asp Pro Ala Cys Tyr Glu Phe Leu  
                     260                      265                      270  
 Trp Gly Pro Arg Ala Leu Val Glu Thr Ser Tyr Val Lys Val Leu His  
                     275                      280                      285  
 His Met Val Lys Ile Ser Gly Gly Pro His Ile Ser Tyr Pro Pro Leu  
                     290                      295                      300  
 His Glu Trp Val Leu Arg Glu Gly Glu Glu  
 305                      310  
  
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 Glu Thr Phe Ser Asp Leu Trp Lys Leu Leu Pro Glu Asn Asn Val Leu  
                     20                      25                      30

Ser Pro Leu Pro Ser Gln Ala Met Asp Asp Leu Met Leu Ser Pro Asp  
 35 40 45

Asp Ile Glu Gln Trp Phe Thr Glu Asp Pro Gly Pro Asp Glu Ala Pro  
 50 55 60

Arg Met Pro Glu Ala Ala Pro Pro Val Ala Pro Ala Pro Ala Ala Pro  
 65 70 75 80

Thr Pro Ala Ala Pro Ala Pro Ala Pro Ser Trp Pro Leu Ser Ser Ser  
 85 90 95

Val Pro Ser Gln Lys Thr Tyr Gln Gly Ser Tyr Gly Phe Arg Leu Gly  
 100 105 110

Phe Leu His Ser Gly Thr Ala Lys Ser Val Thr Cys Thr Tyr Ser Pro  
 115 120 125

Ala Leu Asn Lys Met Phe Cys Gln Leu Ala Lys Thr Cys Pro Val Gln  
 130 135 140

Leu Trp Val Asp Ser Thr Pro Pro Pro Gly Thr Arg Val Arg Ala Met  
 145 150 155 160

Ala Ile Tyr Lys Gln Ser Gln His Met Thr Glu Val Val Arg Arg Cys  
 165 170 175

Pro His His Glu Arg Cys Ser Asp Ser Asp Gly Leu Ala Pro Pro Gln  
 180 185 190

His Leu Ile Arg Val Glu Gly Asn Leu Arg Val Glu Tyr Leu Asp Asp  
 195 200 205

Arg Asn Thr Phe Arg His Ser Val Val Val Pro Tyr Glu Pro Pro Glu  
 210 215 220

Val Gly Ser Asp Cys Thr Thr Ile His Tyr Asn Tyr Met Cys Asn Ser  
 225 230 235 240

Ser Cys Met Gly Gly Met Asn Arg Arg Pro Ile Leu Thr Ile Ile Thr  
 245 250 255

Leu Glu Asp Ser Ser Gly Asn Leu Leu Gly Arg Asn Ser Phe Glu Val  
 260 265 270

Arg Val Cys Ala Cys Pro Gly Arg Asp Arg Arg Thr Glu Glu Glu Asn  
 275 280 285

Leu Arg Lys Lys Gly Glu Pro His His Glu Leu Pro Pro Gly Ser Thr  
 290 295 300

Lys Arg Ala Leu Pro Asn Asn Thr Ser Ser Ser Pro Gln Pro Lys Lys  
 305 310 315 320

Lys Pro Leu Asp Gly Glu Tyr Phe Thr Leu Gln Ile Arg Gly Arg Glu  
 325 330 335

Arg Phe Glu Met Phe Arg Glu Leu Asn Glu Ala Leu Glu Leu Lys Asp  
 340 345 350

Ala Gln Ala Gly Lys Glu Pro Gly Gly Ser Arg Ala His Ser Ser His  
 355 360 365

Leu Lys Ser Lys Lys Gly Gln Ser Thr Ser Arg His Lys Lys Leu Met  
 370 375 380

Phe Lys Thr Glu Gly Pro Asp Ser Asp  
 385 390

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 <212> PRT  
 <213> Mus sp.

<400> 16

Met Gln Leu Phe His Leu Cys Leu Ile Ile Ser Cys Ser Cys Pro Thr  
 1 5 10 15

Val Gln Ala Ser Lys Leu Cys Leu Gly Trp Leu Trp Gly Met Asp Ile  
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Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu Ser Phe Leu  
 35 40 45

Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser  
 50 55 60

Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser Pro His  
 65 70 75 80

His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu Met Thr  
 85 90 95

Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Pro Ala Ser Arg Asp  
 100 105 110

Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln  
 115 120 125

Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val  
 130 135 140

Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala  
 145 150 155 160

Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr  
 165 170 175

Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro  
 180 185 190

Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Arg  
 195 200 205

Glu Ser Gln Cys  
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<210> 17  
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<400> 17

Asp Leu Met Gly Tyr Ile Pro Leu Val  
 1 5

<210> 18  
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<400> 18

Gly Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu  
 1 5 10 15

<210> 19  
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 <223> Ala is D-alanine.

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Ala Lys Phe Val Ala Ala Trp Thr Leu Lys Ala Ala Ala  
 1 5 10

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Ala Lys Tyr Val Ala Ala Trp Thr Leu Lys Ala Ala Ala  
 1 5 10

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Ala Lys Phe Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 22  
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 <222> (1)..(1)  
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 <222> (3)..(3)  
 <223> Xaa is cyclohexylalanine.

<220>  
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 <222> (13)..(13)  
 <223> Ala is D-alanine.

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Ala Lys Xaa Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 23  
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<220>  
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<400> 23

Ala Lys Tyr Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 24  
 <211> 13  
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<221> MISC\_FEATURE  
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 <223> Ala is D-alanine.

<400> 24

Ala Lys Phe Val Ala Ala His Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 25  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<220>  
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 <222> (1)..(1)  
 <223> Ala is D-alanine.

<220>  
 <221> MISC\_FEATURE  
 <222> (3)..(3)  
 <223> Xaa is cyclohexylalanine.

<220>  
 <221> MISC\_FEATURE  
 <222> (13)..(13)  
 <223> Ala is D-alanine.

<400> 25

Ala Lys Xaa Val Ala Ala His Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 26  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<220>  
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 <223> Ala is D-alanine.

<220>  
 <221> MISC\_FEATURE  
 <222> (13)..(13)  
 <223> Ala is D-alanine.

<400> 26

Ala Lys Tyr Val Ala Ala His Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 27  
 <211> 13

<212> PRT  
 <213> Mus sp.

<220>  
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 <223> Ala is D-alanine.

<220>  
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 <222> (13)..(13)  
 <223> Ala is D-alanine..

<400> 27

Ala Lys Phe Val Ala Ala Asn Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 28  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<220>  
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 <223> Ala is D-alanine.

<220>  
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 <222> (3)..(3)  
 <223> Xaa is cyclohexylalanine.

<220>  
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 <222> (13)..(13)  
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<400> 28

Ala Lys Xaa Val Ala Ala Asn Thr Leu Lys Ala Ala Ala  
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<210> 29  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<220>  
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 <223> Ala is D-alanine.

<220>  
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<223> Ala is D-alanine.

<400> 29

Ala Lys Tyr Val Ala Ala Asn Thr Leu Lys Ala Ala Ala  
1 5 10

<210> 30

<211> 13

<212> PRT

<213> Mus sp.

<220>

<221> MISC\_FEATURE

<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<400> 30

Ala Lys Xaa Val Ala Ala Trp Thr Leu Lys Ala Ala Ala  
1 5 10

<210> 31

<211> 13

<212> PRT

<213> Mus sp.

<400> 31

Ala Lys Phe Val Ala Ala Trp Thr Leu Lys Ala Ala Ala  
1 5 10

<210> 32

<211> 13

<212> PRT

<213> alternative PADRE peptide

<400> 32

Ala Lys Tyr Val Ala Ala Trp Thr Leu Lys Ala Ala Ala  
1 5 10

<210> 33

<211> 13

<212> PRT

<213> Mus sp.

<400> 33

Ala Lys Phe Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala  
1 5 10

<210> 34

<211> 13

<212> PRT

<213> Mus sp.

<220>

<221> MISC\_FEATURE

<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<400> 34

Ala	Lys	Xaa	Val	Ala	Ala	Tyr	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 35

<211> 13

<212> PRT

<213> Mus sp.

<400> 35

Ala	Lys	Tyr	Val	Ala	Ala	Tyr	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 36

<211> 13

<212> PRT

<213> Mus sp.

<400> 36

Ala	Lys	Phe	Val	Ala	Ala	His	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 37

<211> 13

<212> PRT

<213> Mus sp.

<220>

<221> MISC\_FEATURE

<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<400> 37

Ala	Lys	Xaa	Val	Ala	Ala	His	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 38

<211> 13

<212> PRT

<213> Mus sp.

<400> 38

Ala	Lys	Tyr	Val	Ala	Ala	His	Thr	Leu	Lys	Ala	Ala	Ala
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

1 5 10

<210> 39  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<400> 39

Ala Lys Phe Val Ala Ala Asn Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 40  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<220>  
 <221> MISC\_FEATURE  
 <222> (3)..(3)  
 <223> Xaa is cyclohexylalanine.

<400> 40

Ala Lys Xaa Val Ala Ala Asn Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 41  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<400> 41

Ala Lys Tyr Val Ala Ala Asn Thr Leu Lys Ala Ala Ala  
 1 5 10

<210> 42  
 <211> 13  
 <212> PRT  
 <213> Mus sp.

<220>  
 <221> MISC\_FEATURE  
 <222> (1)..(1)  
 <223> Ala is either D-alanine or L-alanine.

<220>  
 <221> MISC\_FEATURE  
 <222> (3)..(3)  
 <223> Xaa is either cyclohexylalanine, phenylalanine, or tyrosine.

<220>  
 <221> MISC\_FEATURE  
 <222> (7)..(7)

<223> Xaa is either tryptophan, tyrosine, histidine, or asparagine.

<220>

<221> MISC\_FEATURE

<222> (13)..(13)

<223> Ala is either D-alanine or L-alanine.

<400> 42

Ala	Lys	Xaa	Val	Ala	Ala	Xaa	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 43

<211> 13

<212> PRT

<213> Mus sp.

<220>

<221> MISC\_FEATURE

<222> (1)..(1)

<223> Ala is D-alanine.

<220>

<221> MISC\_FEATURE

<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<220>

<221> MISC\_FEATURE

<222> (13)..(13)

<223> Ala is amidated D-alanine.

<400> 43

Ala	Lys	Xaa	Val	Ala	Ala	Trp	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			